Exemption No. 5765B

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of **Dornier Luftfahrt GmbH** for an exemption from § 25.562(c)(5) of the Federal Aviation Regulations	**Regulatory Docket No. 27432**

PARTIAL GRANT OF EXEMPTION

By letter LREZ-621/94 dated September 29, 1994, and document LREZ-896/94 dated September 29, 1994, Messrs. Buchholz and Goße, Dornier Luftfahrt GmbH, Postfach 1103, D-82230 Wessing, Federal Republic of Germany, petitioned for a time extension to Exemption No. 5765A, which expires on December 31, 1994, and a permanent exemption, respectively, from the Head Injury Criterion (HIC) of § 25.562(c)(5) of the Federal Aviation Regulations (FAR), for front row passenger seats located behind bulkheads in Dornier Model 328 airplanes.

Sections of the FAR affected:

Section 25.562(c)(5), as amended by Amendment 25-64, requires that each occupant must be protected from serious head injury under the dynamic test conditions prescribed in paragraph (b) of this section. Where head contact with seats or other structure can occur, protection must be provided so that the head impact does not exceed a HIC of 1,000 units. The level of HIC is defined by the equation:

$$HIC = \left[(t_2 - t_1) \left[\frac{1}{(t_2 - t_1)} \int_{t_1}^{t_2} a(t)\, dt \right]^{2.5} \right]_{max}$$

Related Section of the FAR:

Section 25.785(a), as amended by Amendment 25-64, requires that each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing must be designed so that a person making proper use of those facilities will not suffer serious injury in an emergency landing as a result of inertia forces specified in §§ 25.561 and 25.562.

The petitioner's supportive information is as follows:

Dornier Luftfahrt is petitioning for a permanent exemption from the HIC requirement of § 25.562(c)(5) for passenger seats located behind the cockpit/cabin bulkhead (RH) and behind the bulkhead (LH).

At the same time, Dornier Luftfahrt GmbH is petitioning for an extension of the partial grant of Exemption No. 5765A from the HIC requirement of § 25.562(c)(5) for front row passenger seats until at least June 30,1995. This petition for extension is intended to allow sufficient time for the FAA to process our petition for permanent exemption.

Dornier Document EK34-2977/94 presents the status on this subject for the Dornier 328, and substantiates Dornier's petition for a permanent exemption from compliance with the seat-to-bulkhead HIC requirements.

The investigations described in that document and carried out by Dornier Luftfahrt GmbH to fulfill the requirements of § 25.562(c)(5) show that there is no available and feasible solution to fully comply with the existing requirements in the near future.

On the other hand, § 25.785(c) establishes "the elimination of any injurious object within the striking radius of the head" as an alternative means of compliance to protect the occupant from head injuries, in addition to the use of seat belt.

The "striking radius of the head" is defined in Advisory Circular (AC) 25-17, "Transport Airplane Cabin Interiors Crashworthiness Handbook," as a 35-inch arc measured from the Seat Reference Point (SRP).

Sheets 1, 3, and 4 of drawing K710 420 in document EK34-2977/94 show the installation of all front row passenger seats with a 1 inch pad, as would normally be provided prior to

Amendment 25-64. As it can be seen, the Dornier 328 exceeds the minimum recommended distance defined by AC 25-17.

To summarize, Dornier Luftfahrt GmbH takes the following position:

(1) All seats except front row passenger seats are fully in compliance.

(2) All front row seats are in compliance with § 25.562 requirements except for HIC values < 1000 required by § 25.562(c)(5).

(3) Research has been carried out to find means of showing compliance with § 25.562(c)(5). Evaluation of the results has shown that there is no practicable solution (considering cost and technical risk) available in the near future to achieve HIC values < 1000 for front row passenger seats.

Above and beyond the expected significant economic implications, we are convinced that it would be inadequate to push for premature design and burden the Dornier 328 program.

This, together with the results of these investigations, leads Dornier to believe that sufficient evidence is available to support a request for a permanent exemption from compliance with § 25.562(c)(5) for seat to bulkhead HIC, and to accept the pre-Amendment 25-64 guidance described in AC 25-17.

It has become known to us that other aircraft projects, e.g., the derivative MD90, have been launched in the meantime without incorporation of the new requirements of § 25.562 into their certification bases. We feel that we are being placed at a competitive disadvantage with respect to other products on the market today.

We do believe that the entire head injury issue is an important safety consideration and worth being investigated and evaluated in the best possible way. Independent from any specific airplane program we feel that at the time of availability of mature solutions, these protective measures should be mandatory for all aircraft programs and benefit air travel.

Granting this exemption is in the public interest because:

(1) Safety is not adversely affected, since the front row seats of the Dornier 328 have the same or an improved level of safety as other commercial transports.

(2) It will not impede development of a technically and economically viable solution which will not result in reduction of seating capacity or in reduction of payload. Reduction of seating

capacity or reduction of payload would incur an economic burden on the operators and in turn increase air fares.

(3) Mature head protection technology is not available at this time to support certification of front row seating to the requirements of § 25.562(c)(5).

(4) At present, neither the industry nor the airworthiness authorities have sufficient evidence which of the currently discussed systems affords the optimal protection in terms of acceptability to the traveling public, maintainability, and interior integration, etc.

(5) Dornier is continuously working together with suppliers for seats and interiors, and within the manufacturers organization, to develop mature designs to fulfill
the requirement of § 25.562(c)(5) at these seats for future projects.

A summary of the petition was published in the Federal Register on December 6, 1994 (59 FR 62771). No comments were received.

The FAA's analysis/summary is as follows:

On October 19, 1993, the FAA issued Exemption No. 5765 from the HIC requirements for front-row seating, until the requested date of June 30, 1994. The exemption was granted in response to industry's reluctance to utilize more readily available solutions to the HIC requirement (e.g., various torso and shoulder restraints, increased clearance), and their preference instead to pursue research into what they considered to be a more commercially desirable but not yet available means of compliance (i.e., "crash pads"). In response to continued unsuccessful testing in this regard, Exemption No. 5765A was issued on June 13, 1994, to extend the compliance deadline until December 31, 1994.

Dornier currently seeks to be permanently exempted from front-row HIC requirements on the DO328. The petitioner's summarized supporting arguments, and the FAA's corresponding responses, are as follows:

(1) All seats except front row seats are in compliance. The FAA does not consider that the acceptable compliance status of other seats is pertinent to any discussion or question concerning the compliance of front-row seats with the same requirements.

(2) The front row seats comply with AC 25-17 guidelines corresponding to requirements that pre-date dynamic seat requirements. The FAA considers that compliance with requirements that pre-date or are otherwise not applicable to the DO328 certification basis is not an acceptable substitute for compliance with applicable requirements.

(3) Dornier suffers a disadvantage because competitive derivative aircraft have not been required to comply with § 25.562 dynamic seat requirements. The FAA notes that the DO328 is a new type design airplane, and consistent with the provisions of part 21, is subject to the requirements current at application for type design. Other new aircraft models such as the SAAB 340, etc., are also subject to the new requirements. Aircraft determined to be derivative models, however, in accordance with § 21.101, are subject to requirements beyond those of the original certification basis only in the area(s) of modification.

(4) Mature, practical, or optimal technology is not available to allow compliance with front-row HIC requirement. The FAA does not consider it reasonable to expect that a "mature" technology should exist in response to a relatively new requirement, nor does it consider it imperative that an "optimal" solution needs be identified in order to comply with the requirement. Similarly, the lack of what is termed within industry to be a "practicable" solution (i.e., one acceptable to the dictates of marketing) is not considered a grounds for exemption from the requirement.

(5) There is no available and feasible solution to fully comply with the front-row HIC requirement in the near future. The FAA does not concur. Marketing considerations aside, an immediately available and technically feasible solution has always been to increase spacing sufficiently to preclude contact. The failure to date to find practicable and optimal solutions must not preclude the eventual consideration and imposition of other less desirable solutions. The petitioner's referenced supporting documentation that outlines the status of Dornier's research into various solutions suggests to the FAA that two means of compliance in particular may indeed become feasible and available in the near future: seat-mounted shoulder harnesses and air bags. In fact, the FAA is aware of considerable and successful air bag developmental activity within the aviation industry. The FAA considers the installation of air bags on airplanes to be a novel and unique feature, however. Consequently, if notified by Dornier that this is their intended means of compliance, the FAA would develop and process the necessary special conditions in accordance with the requirements parts 11 and 21 of the FAR. The fact that air bag special conditions do not yet exist should not be construed as having an adverse impact on approval of such a system for the DO328, because the use of air bags has been discussed within industry, and with the FAA, for some time, and the general criteria have already been outlined. In consideration of the time that may likely be required to initiate and complete certification and retrofit activity involving one of the indicated feasible means of compliance, a one year extension to the existing exemption extension is deemed appropriate. The FAA does not anticipate any circumstances that would warrant further extensions in this regard.

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest, and will not significantly affect the level of safety provided by the regulations. Therefore, pursuant to the

authority contained in §§ 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), the petition of Dornier Luftfahrt for exemption from the HIC requirements of § 25.562(c)(5) of the FAR, for front row passenger seats located behind bulkheads on Dornier Model 328 airplanes, is granted through December 31, 1995, only. The petition for permanent exemption is denied. Other provisions of Exemption No. 5765, together with its conditions and limitations, remain the same and are applicable to this exemption. This amendment is part of, and shall remain attached to, Exemption No. 5765.

Issued in Renton, Washington, on December 30, 1994.

Stewart R. Miller, Acting Manager
Transport Airplane Directorate
Aircraft Certification Service